**GE Area B SLO Evaluation Report June 2020:**

**Background/Description of GE Program Portfolio:**

Prior to the 2017-2018 AY, departments/programs were responsible for assessing GE student learning outcomes and submitting a report every year for the GE Committee to review. This system had several weaknesses. Departments and programs were responsible for deciding which of the two to four outcomes designated for a specific GE Area to assess; thus some outcomes were evaluated multiple times within a year and others were not evaluated at all in certain years. It was also not possible for departments to access and evaluate a representative sample of student work, nor was it possible to compare the results from GE courses in the same GE Area taught by different departments/programs, because each department/program used its own criteria/rubrics. Finally, the GE Committee was not able to review and analyze the GE assessment reports in a comprehensive fashion, since the committee was also tasked with reviewing all GE curriculum proposals, as well as with discussing and updating GE policies and procedures.

Therefore, Fresno State developed a proposal for a new system of evaluating GE student learning outcomes during the 2014-2015 AY. The proposal was approved by Fresno State’s Academic Senate in May 2017 and by Dr. Joseph Castro in August of 2017. Essentially, all freshmen and transfer students admitted to Fresno State beginning in Fall 2018 will submit one designated assignment aligned to one GE student outcome from lower-division (for freshmen) and upper-division (for freshmen and transfer students) GE courses to a GE Program Portfolio. Students will also write 300-word reflections (freshmen write three and transfer students write one) about their learning and submit these to the GE Program Portfolio. The GE Program Portfolio was set up by the Director of Assessment and students were automatically enrolled. Handouts, videos, and other resources that were posted previously to Blackboard were uploaded to Canvas when the campus transitioned from Blackboard to Canvas.

During the first year of implementation (2017-2018 AY), efforts focused on electing members to the new GE Assessment Subcommittee and on approving common rubrics to be used to evaluate GE student learning outcomes. Fresno State’s GE student learning outcomes were approved by the Academic Senate in 2010. These are the forty outcomes that will be evaluated on a five-year schedule. Beginning in the 2018-2019 AY, a team consisting of the Director of Assessment, the ten faculty members serving on the GE Assessment Committee, and the student representative selected a random sample of student submissions for all ten outcomes in GE Areas A1, A2, and A3, then evaluated these submissions to determine proficiency in the GE student learning outcomes for GE Area A. During the 2019-2020 AY, the GE Assessment Sub-Committee reviewed and finalized all rubrics for upper-division GE learning outcomes, reviewed petitions for submission waivers, and created new policies including one that created a process for responding to requests to gain access to the GE Portfolio. The Committee also reviewed the GE Area B1, B2, and B4 learning outcomes and began the process of norming immediately prior to the outbreak of COVID 19 and the subsequent closure of campus. The pandemic crisis had an impact on the assessment of the GE learning outcomes, but all outcomes designated for evaluation during the 2019-2020 AY were assessed.

**GE Assessment Subcommittee: Evaluation and Norming Process:**

Prior to the outbreak of COVID 19, the GE Assessment Sub-Committee reviewed the GE Area B learning outcomes and rubrics. In January 2020, the Director of Assessment and the Chair of the GE Assessment Sub-Committee (Dr. Lisa Bryant) and one additional committee member (Dr. Sankha Banerjee) reviewed submitted assignments and created a list indicating which assignments were aligned to which GE Area B outcomes and this list was shared with the entire committee. In February, the entire committee discussed the evaluation of the GE Area B outcomes and held one norming session and the committee was divided into teams of two faculty members each of which was assigned two GE Area B outcomes. The Director of Assessment, in early March, had begun to contact each team to set up an additional norming session focused on the outcomes which those particular faculty would be evaluating. At the beginning of March just prior to when the meetings would have started taking place, information about COVID 19 became widely available. In mid-March, Fresno State announced that only essential personnel would continue to work on campus and that instruction would be suspended for four days to give faculty time to transition all courses from face-to-face to online. As of March 19th, all professors had to begin teaching their courses online. At this point, the in-depth norming sessions had not been held and each faculty member had to rapidly transition all of their courses (up to four courses not including independent studies) to online. Therefore, the Director of Assessment and Chair of the GE Assessment Sub-Committee Chair (Lisa Bryant) met and decided that under the circumstances it was not feasible to carry out the evaluation according to the previous plan and schedule. Instead, the Director of Assessment (Dr. Melissa Jordine) took over responsibility for the assessment of all GE Area B outcomes prior to the end of June 2020. Dr. Jordine has considerable assessment experience and was able to evaluate all learning outcomes on behalf of the GE Assessment Committee. Dr. Melissa Jordine will set up a meeting with the Chair and entire committee to discuss the rubrics, assignments, and evaluation results. If possible, the GE Assessment Sub-Committee will revisit the GE Area B outcomes before they are scheduled to be assessed again during the 2024-2025 AY. Due to budget issues and the elimination of several administrative positions, it will not be possible to pay faculty a stipend to review additional student work during the summer of 2021. Therefore, the committee will discuss and decide if it is possible for a subset of members of the committee to evaluate a relatively small sample of additional student work during an upcoming academic year.

**Outcomes and measures (assignments) used to evaluate B1 outcomes:**

Upon completion of an Area B1 (Physical Sciences) course, students will be able to**:**

1. Recognize and explain scientific theories, concepts, and data about non-living systems.
2. Use data and observations from a specific scientific field to elucidate scientific hypotheses and theories.

Upon completion of an Area B2 (Life Sciences) course, students will be able to:

1. Recognize and explain scientific theories, concepts, and data about living systems.
2. Recognize scientific principles and apply the scientific method.

Upon completion of an Area B4 (Quantitative Reasoning) course, students will be able to:

1. Represent and explain mathematical information [beyond the level of intermediate algebra] symbolically, graphically, numerically, and [verbally].
2. Apply mathematical (models of) **methods to** real-world situations and explain the assumptions and limitations of those (models) **methods.**
3. Use mathematical (models) **methods** to find optimal results, make predictions, draw conclusions, and check whether the results are reasonable.

Assignments:

Assignments for GE Area B1 consisted of lab assignments and papers from Chemistry, Earth and Environmental Sciences (EES), and Physics courses/lab sessions. Most of the assignments from Chemistry and a few from Physics courses required students to explain the specific steps and results of an experiment they had conducted during a lab session. Some experiments were conducted by an individual student but many were conducted by a group of three or four students. There were also paper assignments from EES and Physics courses that required students to discuss and explain scientific theories and concepts. The assignments for GE Area B2 consisted of papers from Biology courses and labs. The papers from Biology courses included papers on specific scientific theories, principles, and issues while the lab report papers focused on experiments conducted by students during lab sessions. The assignments submitted for GE Area B4 were very diverse and differed based upon the course the student completed. Most assignments submitted from Math courses (Math 10A, 11, 45, 70, and 75) were homework sheets consisting of problem sets but in a few cases midterm exams were the designated assignment. The midterm exams had a greater variety of problem sets including some word problems and charts and graphs. In Decision Sciences 71 (DS 71), offered by the Craig School of Business, homework assignments consisting of real world problems such as financing a car or house or creating a household budget were submitted by students. In Crim 50, offered by the Criminology Department, assignments which required students to analyze graph, charts, and data on crime or population statistics were submitted. Almost all the assignments were very well aligned to the specific GE learning outcomes in the GE Area in which the course was offered. Two of the assignments were only partially aligned to the specific GE learning outcomes and the Director of Assessment will follow up with the professors teaching these sections/courses.

Review Process:

The Director of Assessment Dr. Melissa Jordine, using the assignments previously identified, reviewed twenty-five samples of student work for the seven total outcomes for GE Areas B1, B2, and B4. Dr. Jordine reviewed the notes from the norming session and applied the rubrics according to the guidelines determined by the GE Assessment Sub-Committee. Dr. Jordine also kept notes on the assignments evaluated and on other assignments that were not included in the current sample. Dr. Jordine met with the incoming Director of Assessment (Dr. Douglas Fraleigh) and Chair of the GE Assessment Sub-Committee (Dr. Lisa Bryant) in July of 2020 and discussed the evaluation data with them. A follow up meeting with the entire GE Assessment Sub-Committee will be scheduled for the Fall 2020 semester. The data and the analysis based upon the evaluation of assignments aligned to GE Area B learning outcomes will be reviewed and the Director of Assessment and Chair of the committee will discuss the data with the departments offering the courses in GE Area B, the Provost, the Vice-Provost, and the Dean of Undergraduate Studies.

**Results for Outcomes B1 outcome 1 and B1 outcome 2**

The first outcome for GE Area B1 focused on recognizing and explaining scientific theories, concepts, and data. Papers from EES courses that required students to identify and explain issues related to earthquakes, floods, and other natural disasters aligned well to this outcome. The rubric for outcome 1 had two criteria (recognizing and explaining) and of the twenty-five students evaluated twenty-one were deemed proficient in both criteria while four were not deemed proficient in the two criteria. Therefore, 84% of students were proficient in outcome two and 16% of students were not proficient. Outcome two focused on using data and observations to elucidate scientific theories and hypotheses and the rubric had one criteria. Papers from lab sessions in Chemistry and Physics were used to evaluate this outcome and since the assignments were extremely structured and students were given step by step instructions and so the vast majority of students successfully completed the experiment. As a result, the outcome was judged based upon the analysis and conclusions drawn and not based upon the experiment itself since students did not have to create and plan the experiment. In two cases, the data and conclusions were extremely brief and thus it was not possible to determine if the student really understood the implications of the results. Out of the twenty-five students evaluated, twenty-three were deemed proficient and two were deemed not proficient which means that 92% of students met the expectation and 8% did not meet the criteria for proficiency. The benchmark was for 90% of students to be deemed proficient and thus this standard was NOT met for outcome one but was met for outcome two. Overall, however students did demonstrate their ability to explain and analyze scientific theories, hypotheses, and data.

**Results for Outcomes B2 outcome 1 and B2 outcome 2**

Outcome one for B2 required students to recognize and explain theories about living systems and the rubric consisted of three criteria. The assignments evaluated were several different lab reports from students who had conducted experiments in lab sections of their Biology courses. Of the twenty-five students evaluated, twenty-three of them were deemed proficient in all three criteria and thus 92% met the expectation. Outcome two required students to recognize scientific principles and apply scientific method and the rubric had two criteria. Of the twenty-five students evaluated, 20 were deemed proficient in both criteria and five were not deemed proficient. Therefore only 80% of students were deemed proficient in outcome two which is below the benchmark of 90%. The experiments were relatively structured and so again the student had to go beyond just listing the steps for the experiment and really explain the theory or apply scientific method by drawing conclusions. Given that the experiments were structured and conducted during a lab session where students could ask questions and receive some assistance, the proficiency rate of 80% is lower than expected for outcome two. The results will be discussed with the Biology department and the appropriate faculty and the guidelines for the lab assignments will be reviewed to make sure that the assignments are as well aligned as they were thought to be by the assessment sub-committee.

**Results for Outcomes B4 outcome 1, B4 outcome 2, and B4 outcome 3**

The first outcome for GE Area B4 was appropriate but involved basic or foundational knowledge and this outcome had two criteria which focused on recognizing and explaining mathematical information. Of the twenty-five students who were evaluated, all twenty-five were deemed proficient in both criteria. As previously mentioned, most of the assignments were homework problem sets and the concepts/formulas necessary to solve the problems were covered in class prior to the due date for the homework. Students only had to recognize and explain or solve problems that were important, especially for those students who will need to take further math courses for their major, but not extremely complex. All students in the sample (and a few additional students assignments that were checked) were deemed proficient and one factor which led to the high rate of student proficiency is almost certainly related to the fact that instruction about the concepts occurred right before the homework was due. Unlike most assignments that are evaluated, the Director of Assessment requested graded assignments and in cases where ungraded assignments were submitted Dr. Jordine reached out math instructors to request answer sheets. This was necessary because multiple problems had several steps, all of which had to be correct for the student answer to be right. Therefore Dr. Jordine either used graded homework or obtained the correct answers (with all steps) and checked the assignments against the solutions. Students who had two-thirds of the answers correct and received a score of 75% or higher on the homework were deemed proficient. The actual number of problems was relatively small and thus 75% was designated as the score for proficiency because otherwise a student who only missed two or three problems would not have met the criteria for proficiency.

Outcome two had two criteria and focused on applying mathematical methods to real world situations and explaining these methods. Of the twenty-five students who were evaluated, twenty-three or 92% were deemed proficient in both criteria. The assignments used for evaluation were primarily worksheets from Decision Sciences 71 that required students to work out the financing and interest for buying a car or home or setting up a household budget. Many of the assignments submitted were graded and for these assignments, which were structured into steps by the professor and involved percentages, a score of 80% was necessary to be deemed proficient. In cases where ungraded worksheets were submitted, it was possible to compare the answers to the answers on graded assignments that had been submitted. Students did very well on these assignments and again this material had been covered in DS 71 courses right before the worksheet was given to students. These real-world problem assignments are a signature assignment and are assigned in all sections of DS 71 and all professors teaching this course designate one of these assignments to be submitted by students to their GE Portfolio. As a result, there were a large number of the same assignments available to review and thus a truly representative sample could be selected for evaluation. Almost all students were able to determine the total cost of the car and the amount of interest that the buyer would pay based on the interest rate indicated. Furthermore, neither of the two students who were deemed not proficient completely the entire worksheet and thus they failed because the did not provide all information so it is actually not clear if they have the necessary skills or not. All students deemed proficient, were also able to analyze this information and to explain if the buyer was paying a reasonable or excessive amount of money in interest.

The third outcome for B4 had four criteria, was more complex, and focused on using mathematical methods to find optimal results, make predictions, draw conclusions, and check whether or not the results are reasonable. Of the twenty-five students evaluated, only two of the students were not deemed proficient. Twenty-three of the students were deemed proficient in all four of the criteria. Two assignments were used to evaluate this outcome. The first assignment, from Criminology 50, asked students to review a graph or chart and to use the data to make predictions, draw conclusions, and check those conclusions. The second assignment, from Math 45, involved mathematical equations and again students were required to make predictions, draw conclusions, and check those conclusions. The assignments evaluated were graded and a score of 80% was required for students to be deemed proficient. Again, the problems were very structured with specific steps laid out in the instructions and students had only to fill in or provide a limited amount of information after completing these steps. Although 92% of students were deemed proficient, which meets the benchmark, none of the twenty-three students provided any information beyond what was required and the explanations were just clear and in-depth enough to demonstrate basic proficiency. Moreover, it is not clear that the students would achieve this same level of proficiency if they were only given the data and had to determine the steps and then implement these steps to analyze the data.

**Conclusions:**

Inter-rated reliability was not relevant or calculated for this study in which a single reviewer evaluated all student work. Typically, the Director of Assessment, also reviews a sample of evaluated work to verify that the faculty reviewers have followed the guidelines and applied the rubric criteria appropriately and this step was also not implemented since the Director of Assessment was the sole reviewer. Despite some weaknesses in student assignments and the failure to meet the benchmark in every criteria for all outcomes, overall students were able to demonstrate basic proficiency in the B1, B2, and B4 student learning outcomes. Student proficiency in the B4 student learning outcomes is of greater significance in light of the results of the quantitative reasoning core competency assessment. Fresno State evaluated students at a point near graduation during the 2017-2018 AY and only 51% of the students were deemed proficient in quantitative reasoning. The quantitative reasoning exam that Fresno State developed was too heavily weighted toward calculation but nevertheless students were clearly not sufficiently proficient. The current evaluation indicates that students are learning the material and can demonstrate basic proficiency during their B4 (quantitative reasoning) courses but are unable to retain sufficient knowledge/skills to demonstrate proficiency during their final year at Fresno State. Fresno State has implemented additional support for B4 courses since the core competency evaluation and these measures including additional supplemental instruction may have made a difference in proficiency but there is insufficient evidence to support this claim currently. Students also demonstrated proficiency in the B1 and B2 outcomes and student assignments and student’s abilities to analyze scientific and mathematical data are important. It should be noted that while the actual formal sample recorded was very small (twenty-five students per outcome) that a larger sample of student work (more than a hundred assignments) was reviewed informally in order to select a random sample of assignments and to get an idea of proficiency rates prior to the formal evaluation. The patterns that emerged during the evaluation of the B1, B2, and B4 outcomes clearly show that students have the ability to analyze data and to draw and evaluate conclusions. The students who were not deemed proficient either did not complete the assignment or were unable to accurately analyze scientific or mathematical data. As discussed previously, only 80% of students are proficient in B2 outcome 2 and given the very structured nature of the assignments this is a little concerning and will be discussed with Biology faculty. Nevertheless, the benchmark was met for most outcomes and the assignments demonstrate the proficiency of students in the specific skills relevant for each outcome and the lowest rate of proficiency for GE courses taken primarily by freshmen was 80% which is more than two-thirds. The results and analysis of the student learning outcome data will be discussed with all faculty and departments who teach GE courses in B1, B2, and B4. The data and results will also be presented to the administration (Provost and Vice-Provost) and widely disseminated within the University.